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Comparative flood damage model assessment: Towards a European approach

B. Jongman (1,2), H. Kreibich (3), P.D. Bates (4), A.P.J. de Roo (5), J.I. Barredo (5), A. Gericke (3), H. Apel (3), J. Neal (4), J.C.J.H. Aerts (1,2), P.J. Ward (1,2)

(1) Institute for Environmental Studies, VU University Amsterdam, Netherlands, (2) Amsterdam Global Change Institute (AGCI), VU University Amsterdam, Netherlands, (3) GeoForschungsZentrum Potsdam (GFZ), Potsdam, Germany, (4) School of Geographical Sciences, Bristol University, United Kingdom, (5) European Commission - Joint Research Centre, Ispra, Italy

There is a wide variety of flood damage assessment models in use across countries and institutions, with large variations in their approaches and assumptions. In this study we compare seven established methodologies qualitatively and quantitatively, in order to identify key factors that should be taken into consideration in the development of a pan-European flood damage model. In the comparison, we included seven different flood damage models: FLEMO (Germany), Damage Scanner (The Netherlands), Rhine Atlas (Rhine basin), the Flemish method (Belgium), Multi-Coloured Manual (United Kingdom), HAZUS-MH (United States) and the aggregated EC-JRC approach (European Commission). The study is based on two case-studies of historical flood events, for which both hydrological and land-use data are available, as well as data on observed economic damages. One case-study is based on a 2002 flood event in Eilenburg, Germany. The second case-study covers the 2005 flooding in Carlisle, United Kingdom. We found that the models designed for the specific regions come very close to estimating the observed economic damage. A sensitivity analysis shows that the model results are most sensitive to variation in assumed maximum damage values, and almost as much to variation in the applied depth-damage functions. On the basis of these results, we propose the development of a Europe-wide flood damage model that is based on disaggregated land-use data, local asset values and a variable set of depth-damage functions.